of fossils by one who has thoroughly studied them, and can boldly write down his views.

The memoir will, doubtless, be severely criticised; but it is a notable piece of work, and one which all zoologists may read with advantage.

The first part of Richard Hertwig's memoir, on the development of the unfertilised egg of the sea-urchin, deals almost entirely with the phenomena of nuclear structure and division, and the influence upon them of strychnine and other reagents. The second part of "General Considerations" is an elaborate and exceedingly clever essay on nuclear structure and sexual differentiation.

One of the most important conclusions arrived at, is that the centrosome is a body derived from the nucleus, which passes into the protoplasm of the cell in order to bring into more intimate connection the nucleoplasm and cytoplasm during the process of cell-division.

He points out that, in such cases as Actinosphærium and other Protozoa, and in the formation of the polar bodies of Asteracanthion, where centrosomes are not apparent, there is very slight connection between nuclear division and division of the surrounding protoplasm.

The argument is not convincing, and, as Farmer has recently shown, must be considerably strengthened from the botanical side, at least, before the theory can be accepted.

G. von Koch's essay, on the skeleton of the stony corals, is important and interesting; but it will not attract so much attention as it might have done, had not Miss Ogilvie's memoir, recently published by the Royal Society, been more elaborate and, many will think, better.

Of the memoirs dealing with the anatomy and development of Vertebrata, the one by Hubrecht, on the development of Tarsius, is the most noteworthy. Although the essay is compressed into only thirty pages, and illustrated by but one plate and fifteen figures in the text, it may be regarded as a summary of the most important results of this distinguished embryologist's work.

It is quite certain that the peculiar features of the early development and placentation of the Spectral Lemur could have been rightly interpreted only by one who had worked previously at such mammals as the Insectivora. The extremely important resemblance which the Tarsius embryo at a certain stage presents to the human embryo, at what is probably a corresponding stage, is pointed out by Prof. Hubrecht, and the general features are illustrated by a plate of interesting and instructive diagrammatic figures.

But the memoir is not only strictly embryological; it deals with the zoological position of Tarsius from other points of view, and the conclusions are arrived at, firstly, that Tarsius is, as regards its dentition, intermediate between the Primates and the Mesozoic Insectivora, and secondly, that Cope's genus Anaptomorphus is intermediate between Tarsius and Man.

Of the other memoirs on Vertebrata, two seem to stand out prominently as of more than usual interest and importance. These are the essay, by Klaatsch, on the application of Gegenbaur's famous Archipterygium theory to the question of the origin of the pentadactyle limb, and Rosenberg's memoir on the vertebral column of *Myrmecophaga jubata*.

The former places before the student a clearly-expressed and carefully-considered theory, and is illustrated by numerous really admirable figures. Rosenberg describes some variations he has met with in the vertebral column of Myrmecophaga, and discusses fully the vexed question of the homologies of the Vertebræ in the Mammalia.

Other contributions to this work have been made by Boas, Oscar Hertwig, Corning, von Davidoff, Solger, van Bemmelen, Scott, Seydel, Maurer and Göppert; and it is not faint praise to say that they are well worthy of a place in these volumes.

Since the above was written, the third volume of this gigantic "Festschrift" has been forwarded to us. It is even larger and more profusely illustrated than the first two volumes, and is entirely devoted to questions of vertebrate anatomy. Four of the seven memoirs are concerned with the cranial and spinal nerves. Goronowitsch confines his attention to the Trigemino-facialis complex of Lota, and Haller to the Vagus group of the bony fish, the two essays taking the modest share of one hundred pages.

Unfortunately, perhaps, G. Ruge, who writes on the facial nerve of vertebrates, and Fürbringer on the spino-occipital nerves of the cartilaginous fish, have been unable to confine their contributions within these limits. To attempt to criticise the 600 pages which they take, would mean an attempt to criticise an encyclopædia of vertebrate knowledge. The student, however, will find in them a mass of solid facts which have important bearings on many important questions that are much discussed in these days. Fürbringer's memoir in particular, although overpowering in its size, has many passages which summarise, in a clear and masterly manner, questions of the homologies of nerves, and in this respect, at any rate, will form a most useful work of reference for anatomists.

Of the remaining three monographs the most important appears to be the one by Semon, on the excretory system of the Myxinoids. As in the earlier works of this distinguished anatomist, the reconstruction figures he gives are admirable.

Max Weber's interesting essay on the brain weight of Mammals, and Leche's researches on the teeth of recent and fossil Lemurs, are important contributions to knowledge; and although much shorter than others in this volume, are not the less valuable indices of the character of the work that has been produced by the pupils of Carl Gegenbaur.

THE DREARY DESERT OF NORTH TIBET.

Works of the Tibet Expedition of the Years 1889–1890, *under M. V. Pyevtsoff*; Part iii. 4to, pp. 127; with six maps. Published by the Russian Geographical Society. (Russian.) (St. Petersburg, 1896.)

THIS third part of the excellent publication issued by the Russian Geographical Society, contains the records of the incursions of Roborovsky and Kozloff into the border-ridges of the great Tibet plateau. While the main body of the expedition followed the northern foot of the Astyn-tagh border-ridge (or the "Russian Moun-

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tains"), *viâ* the oases Niya and Cherchen, to lake Lob-nor, Roborovsky and Kozloff, with two or three men, pushed into the mountains, and beyond, into the wildernesses of the northern part of the Tibet plateau. These excursions, which were made under great difficulties, and in one of which Roborovsky's party was very nearly lost, are described in the present part of the "Works" of the expedition, and illustrated by six maps on the scale of 13 miles to an inch. The most important of these reconnoitring expeditions was the second, made by Roborovsky, when he crossed the Astyn-tagh, and, following a valley at its south-eastern foot, between the Astyn-tagh and the steep snow-covered Uzü-tagh, reached the Keria river, as it issues from the Tibet plateau and turns north-westwards, fringing the mighty glacier-covered Kuen-lun. No inhabitant of Kashgaria ever went that way, and nobody ever came to Kashgaria from that quarter; only a few gold-diggers visit the above-mentioned valley, without ever daring to penetrate further south into the dreary wilderness of the high plateau. Roborovosky did so, notwithstanding the terrible snowstorms, one of which, on May 22, covered the ground with three inches of snow. After having reached the Keria river, which flows at an altitude of 14,300 feet, and must be a mighty stream in summer, Roborovsky returned; but he came once more to the same spot, a couple of weeks later, moved by the desire of crossing the Uzu-tagh and of casting a glimpse on the dreary desert in the south of it. The altitude of the desert was 16,600 feet, and on June 12-14 almost no signs of life were found on it. Its surface is covered with low rows of stony hillocks, consisting of sharp-edged broken strata of quartzite, running west and east. A few bushes of a willow were found after a 22 miles' march, but no lichens were seen; and the only animals noticed were a few broken-down *orongo*-antelopes, which slowly walked within a few yards from the party—too weary to pay attention to it. Only snow seems to fall all the year round in this desert, and rain must be quite unknown. In June, snow fell every day, and evaporated immediately. On June 15 the altitude was 17,080 feet, and the temperature −12° Celsius in the morning. The horses were severely suffering from the sharp stones, and broke down; so that the party was compelled to return, after having covered only 40 miles southwards. The desert stretched further south, as far as the foot of the snow-covered Kuen-lun. The return journey was extremely difficult, one horse only being able to stand it; and it was in a desperate condition that Roborovsky's party reached a spot where they had left some of their provisions.

The sand-storms in that part of Kashgaria, at the foot of the mountains, are simply terrible. The loess-terrace, which fringes the highlands, is easily destroyed by the wind, and the dust is carried in the air, becoming occasionally so dense that complete darkness prevails—nothing being seen at a distance of some ten yards. If it rains during such a dust-storm, the drops of rain evaporate as they fall, and the dust they carry with them falls in the shape of small lumps. Whole forests of poplars are buried in the loess-dust hillocks, forty feet high being blown round the trees, which soon die and slowly decay, after the wind has carried the hillock away, to spread the dust further on.

Another excursion into the highlands, during which nearly 500 miles were covered and mapped, was made to lakes Achik-kul, Chom-kum-kul, and "Unfreezing"—a salt lake at an altitude of 13,300 feet, which has various species of *Gammarus* among its fauna—and to Prjevalsky's Ridge, which is a mighty chain of mountains, buried in snow, running west and east under a number of local names, and very rich in animal life in its northern spurs.

A fourth excursion was made along the Cherchen-daria, which flows in a flat-bottomed valley, and has on both its sides two strips of sands, arranged by the wind in the shape of *barkhans* (rows of hillocks), attaining the extraordinary height of 360 feet. Great numbers of wild camels, stags, antelopes, wild cats, boars, and masses of small rodents and spiders, belonging to a variety of species, inhabit these sands, while the banks of the river are covered with poplars, tamarisks, and rushes. Traces of recent desiccation are found everywhere, and immense spaces are occupied with marshes, now covered with rushes, and strewn up with masses of fresh-water molluscs—the former inhabitants of a great lake. The population of the Lob-nor depression consists of half-breeds between Aryans and Turco-Mongols, who live in huts made of rushes, keeping some cattle, and carrying on fishing to a great extent.

The accounts of Roborovsky's and Kozloff's excursions to lake Bagrach-kul, near Karashar, and Kozloff's, up the Konche-daria, are also full of interest, and, like the preceding, give a good idea of the physical characters, flora and fauna, of the visited regions. General Pyevtsoff's discussion of Roborovsky's altitudes and astronomical observations completes this very interesting volume.

P. K.

OUR BOOK SHELF.

Algebra for Beginners. By T. Todhunter. New edition, revised and enlarged by S. L. Loney. Pp. xxxvi + 428. (London: Macmillan and Co., Ltd., 1897.)

THIS excellent elementary treatise is too well known to require detailed description in these columns, so we need only refer to the changes which have been made by the reviser of the new and enlarged edition. Prof. Loney has given additional chapters on negative quantities, the theory of quadratic equations, logarithms, and miscellaneous theorems, each of which has been inserted in those parts of the book which seemed most appropriate. The chapter on factors has been rewritten, and chapters towards the end have been considerably expanded. By renumbering the paragraphs, and maintaining the old numbers in smaller type, the reviser has facilitated the use of employing both editions together; the newly-added paragraphs contain only one—namely, the new—system of numbers. As examples form a very important part of such an elementary book as this, Prof. Loney has thought fit to more than double the original number, the answers being, as usual, included in the list at the end. Teachers will thus find in this edition a most complete and efficient course, and one especially adapted for boys commencing the subject.

Picture Lessons in Natural History. A series of diagrams on roller. (London: G. W. Bacon and Co., 1897.)

THE four sheets before us, which, we presume, form only a portion of the series, include the Protozoa and "Invertebrates." From all points of view they seem admirably

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